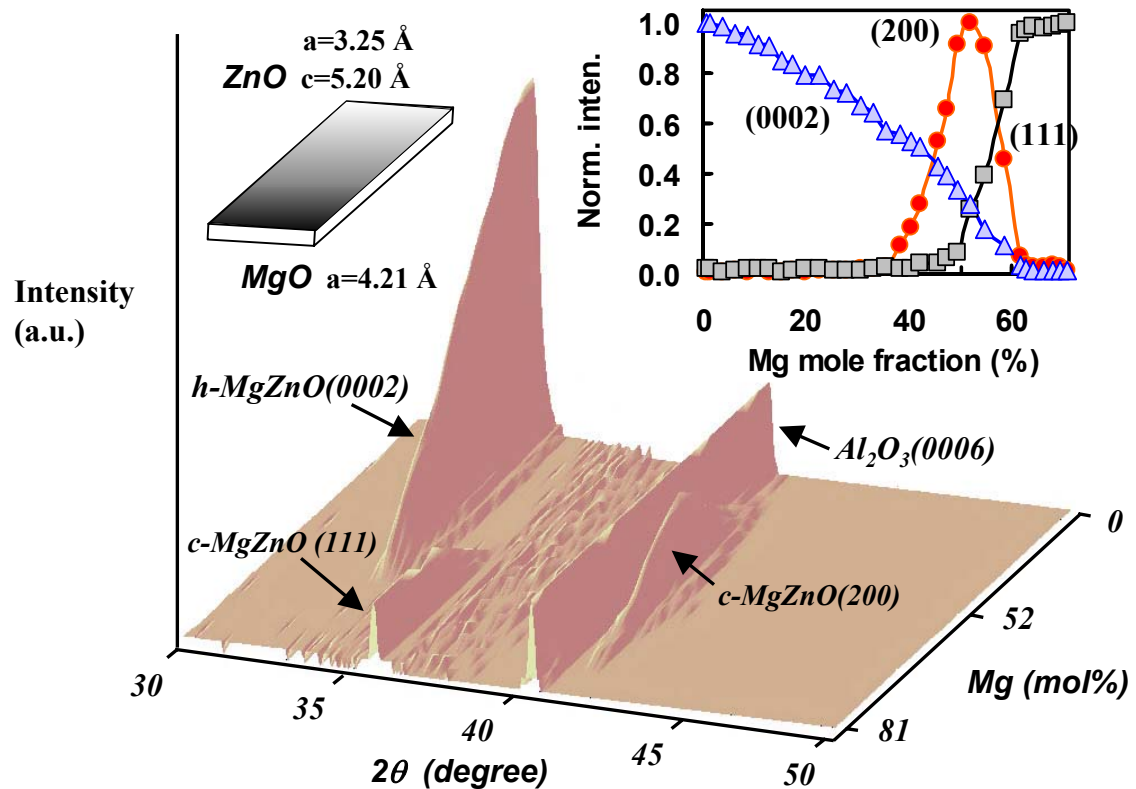


Development of a scanning x-ray microbeam for characterization of combinatorial libraries and education

I. Takeuchi and L. Martinez-Miranda, University of Maryland, DMR-0076456

Combinatorial libraries and composition spreads are used to rapidly explore novel compositional phase spaces. The scanning microdiffractometer plays a central role in mapping the phase distribution in these samples. Figure on the right is from an experiment where we mapped the evolution of phase change across a ZnO-MgO epitaxial composition spread. We have clearly delineated the phase separated region (where hexagonal and cubic phases coexist). Just from one scan, one can gain insight into the nature of the growth process and the dynamics of the phase separation.



θ - 2θ versus composition of a $\text{Mg}_x\text{Zn}_{1-x}\text{O}$ composition spread taken with a 300 mm diameter spot x-ray beam in the range shown from $x = 0$ to 0.81. The left inset shows the schematic of the spread chip and the lattice constants of the end compositions. The right inset shows the normalized intensity ratio as a function of composition. The triangles, circles, and squares are from the hexagonal (0002), cubic (200), and cubic (111) peaks, respectively.